

SUBACUTE BACTERIAL ENDOCARDITIS

by

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SUBACUTE BACTERIAL ENDOCARDITIS.

The study of Subacute Bacterial Endocarditis has of recent years assumed a position of great importance in practical medicine. Many authors claim that the disease is a fairly common one. It may be, however, that the wealth of literature bearing upon the subject, which has appeared during recent years, has tended to popularise the cardinal features to such an extent that fewer cases go undiagnosed than was formerly the case. Though the disease may be familiar to the physician who has a store of cases to investigate from year to year, the rural practitioner carrying on his profession in sparsely populated areas, must needs find the disease rather infrequent, if indeed not rare.

HORDER (1) in a paper read at the Cambridge Meeting of the B.M.A. defines Subacute Bacterial Endocarditis as the accepted name of a disease having more or less of the following features. The onset is most often insidious; the general symptoms include loss of strength and tone, a sallow complexion with anaemia, moderate loss of weight, and fever; the heart gives evidence. /

evidence of Endocarditis at some time or other in almost all cases, and in the majority there has been previous valve injury; widespread arterial embolism takes place; the isolated bacterium being either a short streptococcus, much less often Pfeiffer's bacillus, and rarely a micro-organism difficult of identification; but in all cases the microbe is of low pathogenicity.

The course of the disease is slow but progressive, and though remissions occur, it is, once established, almost invariably fatal. The total duration of the illness is from three months to two years, with an average duration of six months: death occurs from heart failure, from uraemia, or from cerebral or coronary embolus.

The post-mortem findings include a vegetative endocarditis on the valves or wall of the heart, with little or no ulceration, and widespread embolic infarction without suppuration. As a result of the embolic process there is found a form of glomerular nephritis more or less characteristic of the disease.

History. /

History of the Disease.

LIBMAN (2) at the International Congress presented a communication based on 125 cases of Subacute Bacterial Endocarditis. He says that the first author to draw prominent attention to the disease was Sir William Osler in his Goulstonian lectures in 1885. In this paper will be found references to earlier observations by Wilks, Bristowe, and Coupland. Following a later paper in 1909 by Osler there appeared an important contribution in England by Horder. The most important German studies are those of Lenhartz, and Schottmueller. The disease, however, had been known to Fraentzel, Litten, and Von Leyden. Latour in 1912 published a monograph from which it is evident that the disease was known to French observers for a very long time, because some of the observations of Rapin go back as far as 1871. Rapin describes the tender nodules of the disease in some detail. The studies of Harbitz in Christiania on the pathology of various forms of endocarditis constitute a most important contribution. This author was quite early aware of the possibility of spontaneous healing of the lesions of the disease. Practically the only studies on the immunological side of this disease have been published by Rosenow of Chicago. The frequency of the disease is much underestimated.

The CLINICAL PHENOMENA as described by various Authors.

HUDSON (3) reports a case which showed insidious and slow progress with no definite cardiac symptoms. The patient was never really "cardiac:" there was no dyspnoea or oedema, and the pulse remained steady, slow, and regular to the end. He was in a "typhoid" state throughout the disease, and died eventually of slow toxæmia. The heart never became enlarged although post-mortem examination showed a large cauliflower-like vegetation on one cusp of the aortic valve which almost completely closed the orifice of the valve. This vegetation probably prevented any leaking of the valve. The patient was admitted into No.2. Red Cross Hospital with a diagnosis of "Endocarditis". He was pale, somewhat wasted, and in a "typhoid" condition, drowsy, and of slow mentality, There was a loud diastolic murmur conducted along the sternum and also an apical systolic murmur. The spleen could not be felt. The patient was covered with small petechial spots which kept coming out in crops throughout the disease. Blood culture was always negative, and there was never leucocytosis - the white cells numbering from 7000 to 8000 per c.mm.

STARLING (4) records five cases. He emphasises the following points in connection with the disease:-

1. Ephemeral spots of painful, nodular, erythema.

This lesion was first described concisely by Osler, and subsequently at some length by Parkes Weber.

These vary in size and colour. They are generally seen in the fingers, and probably arise when the inflammatory process is superficial, whereas the larger and less highly coloured tender lumps appear when the inflammatory process is more deep-seated, and are more decidedly felt as distinct nodules under the skin. In 2 - 3 days the pain and the surrounding flush and swelling disappear leaving a small erythematous point behind.

2. Petechiae were seen in all the cases in varying degrees, and at different times. In two cases these occurred in "showers" over the chest, abdomen, and thighs.

In one case they were infrequent, only one or two occurring at a time. They last from two to four days, and are not necessarily observed by the patient. They vary in size from the minutest puncture to a pin's head.

3./

3. Splenic enlargement. - This was present in all cases.

The patients complained of a good deal of pain over this organ, and a rub could sometimes be heard on auscultation.

4. Fever. - In no case was the pyrexia severe. In some there were long periods of apyrexia, so that the occurrence of pyrexia may be missed unless closely watched.

5. Emboli. - Four cases demonstrated the presence of arterial embolism in an unusual degree. These emboli never give rise to any suppurative process, though considerable inflammatory reaction ensues in the vessel itself and in the surrounding structures, including the skin.

Pulsation is often felt distally to the site of injury subsequent to a period of complete occlusion.

6. Haematuria was not marked in any of the cases.

7. Colour of face. - Four cases exhibited a considerable degree of anaemia, and two were of a "cafe-au-lait" colour for a considerable period before death.

Blood culture - Only one case gave any cultural reaction.

The growth was a coccus, gram positive, occurring in pairs, but also showing a tendency to short chain formations of

5 - 16. One case whose blood gave a negative result showed a gram positive coccus in scrapings from the valve vegetations.

Libman. /

Libman of New York states that these spots, or nodes of Osler, are pathognomonic of a particular type of endocarditis which he terms "Subacute Bacterial Endocarditis." In a total of 171 cases he found a characteristic coccus which he calls *Streptococcus mitis*. In subsequent papers he describes three different stages of the disease: the bacterial: the bacteria-free: and the healing. The second and third conditions often coexist. According to Libman an important condition present in all these cases is a particular form of glomerular nephritis, originally described by Loehrlein and Gaskell, and subsequently by Baehr. This condition was present in 23 out of 25 cases of this disease diagnosed during life. It was absent in 54 cases of endocarditis due to other organisms. The lesion is minute embolic infarction of the glomeruli with subsequent swelling and hyaline change.

LIBMAN (5) From 1902 up to May 1910, Libman (4) observed clinically and bacteriologically, or made bacteriological studies alone in 43 cases. From May 1910 to May 1912 he saw 46 cases: and since May 1912 26 additional cases. Organisms were recovered in 73 out./

out of 75 cases seen by him in the bacterial stage up to 1912. In 71 the cocci characteristic of the disease were found, and in 4 the Influenza bacillus. The symptoms in the latter were the same as in the former. These cocci appear to correspond to the coccus called streptococcus viridans or mitis by Schottmueller; streptococcus salivarius by Horder, and pneumococcus by Rosenow.

The important point concerning the bacteriology is that if the micro-organisms are carefully studied when they are obtained from a patient, they are quite distinct from the ordinary pneumococcus and streptococcus, and therefore can be well classed by themselves.

This is especially important for clinical purposes, for while they are quite frequently found in local infections, they are rarely present in the blood unless the endocardium is infected. The disease occurs nearly always in people who have previously had a valvular affection. In most of these cases there is a history of rheumatism, but occasionally the organisms infect a valve which has been the seat of syphilitic or atherosclerotic disease.

The /

The onset of the disease is usually insidious; the patient complains of lassitude, vague pains, loss of appetite, feverishness, chilliness, vertigo, or cardiac symptoms. The constant symptom is the fever: this usually low at first, but becomes more elevated later. It is apt to be intermittent or remittent, and it is common to observe periods lasting a few days or even longer, during which time there is little or no fever. Towards the end of the disease the fever may disappear. In some cases chills occur at irregular intervals; in other cases they dominate the clinical picture. The chills are often accompanied by profuse sweating, but sweating occurs frequently without chills. Progressive anaemia and wasting are striking features. The blood reveals a secondary anaemia which is often very intense. The leucocytes are sometimes hardly increased; at other times there may be a high leucocyte count, with a decided increase in the polymorphonuclear percentage, even though complications be not present. Petechiae occur very frequently, in fact in nearly all the cases; those with the white centres are the most characteristic. They may be few in number or quite abundant. /

abundant. Aneurisms occur in the various organs causing infarctions. Embolic aneurism seems to be more frequent in Subacute Bacterial Endocarditis than in other forms of infection. There may be rupture with resulting haemorrhage. Along the course of the vessels may be found very small tender swellings which represent areas of inflammation - possibly some are minute aneurisms.

Cough is not infrequent. Embolisms of the kidney are very frequent, and gross haematuria may result. Microscopic haematuria is quite a constant feature of the disease. Albumen and various forms of casts may be present - rarely is there developed evidence of profound renal disease.

The spleen is enlarged, palpable, and soft. Abdominal pains are very frequent, due to involvement of the spleen, kidneys, acute hepatic enlargement, aneurisms and haemorrhage in the peritoneum.

Pains in other parts of the body occur, and are due to a variety of causes. Tenderness of the sternum is an interesting symptom, described by Libman in 1910, occurring in a number of cases very late in the disease.

Cerebral symptoms are not uncommon towards the end, especially headache and delirium. There may be extensive haemorrhage. /

haemorrhage due to embolism or rupture of an embolic aneurism. Not infrequently there are swellings of joints, and periarticular swelling. As a rule these joint affections are milder than those of acute rheumatism, and generally there is no redness over the involved joint.

Libman points out that in his experience nearly all the cases in which bacteria were found in the blood, and which could be followed, went on to a fatal termination with bacteria still present in the blood. In a few cases only did the blood cultures become negative, and these patients also soon died.

LIBMAN (6) describes a bacterial and a bacteria-free stage of the disease - the bacteria-free eventually dying of after-results. He applies the term "bacteria-free" to those cases which have no bacteria in the blood, and none in the vegetations as determined by crushing them, and using a variety of staining methods. These cases may run as long as two years or more after they come under observation, and usually are not febrile except when a complication arises.. /

arises. At the post-mortem examination one finds fibrosed and calcified vegetations, fibrosed chordae some of which are torn. In the kidneys, in nearly all the cases, one finds the typical glomerular lesion in healed state. Some of these cases present from time to time the pathognomonic Osler node. Clinically, these patients, besides presenting some of the symptoms seen in the active (bacterial) stage - such as petechiae (the white centred ones being the most valuable for diagnosis) a tender sternum, moderate splenic enlargement, "cafe-au-lait" colour of face etc. - have certain clinical features that are distinctive. Some develop renal insufficiency and die of uraemia; some die of progressive anaemia, and others of embolism. In some a very marked enlargement of the spleen is found, and these patients are usually suspected of being victims of Banti's disease. A few present a dark-brown colour of the face that is distinctive. It is to be noted that some or nearly all these features may be grouped in a single case. The renal insufficiency is due to glomerulo-nephritis, and not to the small lesions in the glomeruli described by Loehlein. Other cases show a diffuse type of nephritis (secondary interstitial nephritis).

ETIOLOGY.

According to LIBMAN (7) Subacute Bacterial Endocarditis is due to the streptococcus anhaemolyticus in about 95% of the cases. The other 5% are due mainly to the Influenza bacillus. He discusses the main types of Endocarditis and gives three viz:- Rheumatic, Syphilitic, and Bacterial - acute and subacute. He says that Rheumatic Endocarditis differs from Subacute Bacterial Endocarditis in important particulars. In rheumatic fever there is frequently present Pericarditis, which occurs in Subacute Bacterial Endocarditis only rarely, then being due to some other intercurrent disease, or due to extensive infarction of the heart muscle. The skin over the joints is often red in rheumatism, and erythema nodosum may occur. From a pathological standpoint there are sharp differences. The lesions in rheumatic endocarditis are small, firm, and covered by endothelium. In the heart muscle Aschoff bodies are found, and Pericarditis is frequent. In Subacute Bacterial Endocarditis another type of lesion is found in the heart muscle - the so-called "Bracht-Wachter" body, which. /

which has been produced experimentally by several observers (specially Thalhimer and Rothschild). In the kidney, in the subacute bacterial group, there are the lesions described by Loehlein, and later by Baehr and Gaskell. These lesions, which almost always involve only part of a glomerulus, are almost specific for the disease, rarely occurring otherwise. They never have been found in acute bacterial or rheumatic endocarditis.

In rheumatic fever streptococci of the anhaemolytic type (non-haemolytic, so-called streptococcus viridans) have been found in the blood of 8 out of 58 cases. But in these organisms a positive complement fixation test was never found - in contradistinction to the obtaining of uniformly positive results in cases of Subacute Bacterial Endocarditis when the blood is tested against the blood of the homologous organism. In rheumatic fever the cocci found probably represent a secondary invasion.

SMITH and KENNICUT (8) report a case of fatal Endocarditis due to a capsulated gram-staining diplococcus occurring in chains. The bacteria are peculiar. They have certain resemblances to pneumococci on the one hand, and streptococci on the other.

KAMMERER /

KAMMERER (9) in a treatise on the pathology of Endocarditis lenta, comes to the conclusion that the results from infection are a gram-negative coccus, and a micrococcus flavus.

MALLOCH and RHEA (10) give a report on two cases of Endocarditis due to the Influenza bacillus. In both cases B. Influenza in pure culture was obtained from the bronchial secretion, and in one case the same bacillus was obtained in pure culture from the heart's blood.

The organism is usually of low virulence, and the seat of local infection may be a carious tooth (Case 1) Amongst factors predisposing to the production of the disease, there is general agreement that rheumatic fever plays an important part. There is little doubt that previously damaged valves, and a condition of diminished bodily resistance, open up a way for the infecting micro-organism.

According to HORDER (11) in about half the cases met with there is a history of acute or subacute rheumatism, followed by varying periods of good general health. Other diseases of significance in the patient's past history, /

history are Scarlet Fever, Gonorrhoea, Typhoid Fever, Malaria, Syphilis, Influenza, Graves's disease, Dysentery, and Pneumonia. There is abundant evidence for saying that in the great majority of the cases the Endocardium has suffered previous damage.

Modern views as to the relative unimportance of cardiac bruits in the presence of sound cardiac muscle, though they have been valuable in helping to adjust certain disproportionate ideas concerning the functional integrity of the heart as an organ, must not be allowed to dispose of the known importance of scarred valve cusps in determining bacterial invasion and infection.

POYNTON (12) maintains that Subacute Bacterial Endocarditis is not a special disease, but a phase of cardiac infection resulting from various causes, one of the most important being the Rheumatic. He challenges Horder's statement that the Endocarditis "associated with" rheumatism is bacteria-free, and submits a counter statement that the Endocarditis in rheumatism is "caused by" and not "associated with" the disease, and that in its early stage it is not bacteria-free.

He. /

He argues that the condition of rheumatic endocarditis cannot be excluded from the discussion of Subacute Bacterial Endocarditis for the following considerations: -

A patient, having recovered from one or more attacks of rheumatic endocarditis succumbs, at a period more or less remote, from Subacute Bacterial Endocarditis, rheumatic endocarditis not being bacteria-free, what relation did the bacteria which caused the fatal illness bear to those which caused the earlier rheumatic endocarditis? His explanation would be that the heart of this patient had never really recovered from the early attacks, but that unhealthy bacteria-containing foci had been left in the valves, which, when the health became degraded by overwork, evil surroundings, or other cause, became locally virulent, flared up, and caused the final catastrophe of Subacute Bacterial Endocarditis.

He illustrated on the screen the bacterial origin of rheumatic endocarditis, and the formation of necrotic foci in the valves in rheumatic, simple, and progressive endocarditis.

CAREY COOMBS, /

CAREY COOMBS (13) says that histological examination proved that most of the hearts attacked by this disease had already been handicapped by previous infections, particularly by rheumatic infections. It seemed to him that the infecting agent was comparatively unimportant as it was not a constant. Such evidence as there was showed that the streptococcus was the same as that of rheumatic infection, although in the latter it was acting with enhanced virulence. If that were so the streptococcus must be relying for the production of Subacute Bacterial Endocarditis, not on its own increased powers, but on the diminished resistance of its victim. Lowered general resistance, he believed, was of more practical importance than the question of oral sepsis.

From a study of the post-mortem records at the Pathological Department of the Edinburgh Royal Infirmary, the following particulars, bearing on the morbid anatomy of the disease, have been obtained.

Case No.177, Vol.2. 1911. The right ventricle was hypertrophied. The mitral orifice was dilated, the cusps being greatly thickened. The valve was the seat of vegetations gray in colour, and moderately firm. The left ventricle was dilated and much hypertrophied. There was a thrombus plugging a branch of the posterior cerebral artery, leading to aneurism, rupture, and haemorrhage.

Case No.280, Vol.2. 1917. Thomas Nottman. Admitted 19-10-17 with severe pain in the precordia, and a swinging temperature. He died from cardiac failure. The tricuspid valve was incompetent, but there was no endocarditis. The mitral valve on the auricular surface was covered with a vegetation which was large, rough, and irregular. The mitral cusps and chordae tendineae were thickened, and the free ends of the chordae attached to the valves and capillary muscles were covered with rounded./

rounded vegetations. The vegetation had formed on the ventricular surface of the aortic cusp of the mitral valve, and had spread upwards in a continuous layer to the cusps of the aortic valve. These cusps were thickened also from old standing endocarditis. Other findings were infarction of spleen and kidney; aneurism of the superior mesenteric artery; parenchymatous nephritis.

Case No.200, Vol.3. 1917. Arthur Fisk.

Patient was brought into the R.I.E. with the history of a blow on the head, and he was examined by the order of the Procurator Fiscal. A very large vegetation was found on the mitral valve. There was no marked dilatation or hypertrophy of the left ventricle. The aortic valves were thickened, but showed no vegetations.

Case No.216, Vol.2. 1918. Christina Douglas.

Admitted into the R.I.E. in a delirious condition, with a history of illness lasting over five weeks; weakness, and anaemia. The urine contained albumen and blood.

The aortic valve was the seat of a large vegetation the size of a broad bean. There was no sign of old endocarditis./

endocarditis of the valve. The kidneys showed subacute parenchymatous, diffuse, nephritis, and there was an infarction of the spleen.

Case No.141, Vol.2. 1919. The left ventricle was a little hypertrophied, and there was an organising thrombus in the left auricle. The aortic cusp of the mitral valve was thickened, and was the seat of a large ragged vegetation. Other findings were thrombosis of brachial and splenic arteries; old infarcts in kidney and spleen; acute parenchymatous nephritis. On 5-3-19 a gram-positive streptococcus of the haemolytic group was found in the blood.

Case No.103, Vol.2. 1920. James Sinclair.

The mitral valve exhibited a chronic endocarditis. A few small recent vegetations were present on the auricular aspect of the cusps, and there was a large pale one on the ventricular aspect of the septal cusp. The aortic valve showed a chronic endocarditis on all the cusps. Other findings were a-typical lobar pneumonia; subacute nephritis; infarction of spleen. There was no definite history of rheumatic fever, and the blood gave a negative Wassermann.

1921. Andrew Stirton. (Professor Boyd's case).

Heart was much enlarged, right auricle and right ventricle were dilated, but the cusps were healthy. The left auricle was distended, and the anterior wall was roughened with small vegetations. The mitral orifice admitted three fingers with ease. There were vegetations of various sizes on both cusps - the aortic being most affected - its ventricular surface showing an almost pedunculated vegetation. The cusps showed chronic thickening. Other findings were cerebral haemorrhage; infarctions in spleen and kidney.

Lily Forbes, aet.32 (Prof.Meakin's case).P.M.2-2-21.

Body rather emaciated. Oedema of arms and legs.
Subcutaneous haemorrhages in regions of knees.
Lungs - Acute broncho-pneumonia and small haemorrhages.
Liver - Chronic venous congestion.
Spleen - This was about thrice the average size, and showed several infarcts.
Kidneys - Both slightly smaller than usual and distinctly paler. One large recent infarct in right kidney.
Brain. /

Brain - One small subarachnoid haemorrhage in right parietal region.

Heart - Left auricle slightly dilated and hypertrophied.

Mitral valve - There project into the auricle great fungating pale vegetations, arising from the left half and leaving the right half of the valve free for the passage of blood. On those portions of the cusps which are free of the large vegetations are small firm

projections, not unlike those seen in simple acute endocarditis. Small vegetations are present on endocardium of auricle which has been in contact with the large vegetations, and others are found on chordae tendineae, papillary muscles, and septal endocardium of ventricle. The valve cusps show some fibrous thickening but to no marked extent. There was probably slight stenosis. Left ventricle - of average size.

Aortic valve - absolutely healthy.

Myocardium - of all chambers - is extremely pale.

Microscopic: Mitral valve - cusp thick and vascular, vegetation undergoing organisation at base, elsewhere it consists of fibrin and organisms. These are seen to be streptococci.

DIAGNOSIS.

Early symptoms:- HORDER (14) describes these as follows. - Ill-defined malaise, slight anaemia, some loss of weight, irregular fever, sweats, erratic pains in the limbs or back, or joints, or fingers or toes, areas of redness or tenderness developing on the hands or feet - one or more of these in any patient in whom a critical examination of the heart fails to pass it as organically sound, should rouse our suspicions, and should lead to a special examination for definite stigmata of endocardial infection.

He enumerates four cardinal signs when the disease is fully evolved. Arranged in the order of their importance from the point of view of diagnosis they are:- Multiple arterial embolism, endocarditis, the isolation of a bacterium from the blood stream, and fever.

GOW (15) draws attention to an early cutaneous manifestation in the form of a recurrent, transient, erythema or scarlatiniform eruption, irregular in distribution, often symmetrical, involving the inner side./

side of the legs and forearms, or the front of the trunk. He considers this toxic in origin, and the condition is not infrequently associated with fleeting joint pains, which may themselves be due to a like erythema of the synovial membrane. The septicaemic state is in general associated with a leucocytosis, and in this disease a count varying between 10,000 and 20,000 per cmm is the rule. Leucopenia, however, is a fairly frequent occurrence. He has observed two cases in the same ward in which the leucocyte count has never been found above 5,000 per cmm.

GIBSON (16) emphasises the difficulty of differentiating between a petechia and a minute naevus that cannot be rendered bloodless. He gives the anatomical definition of a petechia as any small leakage of blood, with or without a pale centre, which does not fade on pressure. Isolated small petechiae are always difficult to interpret, but multiple petechiae are certain evidence of damage to vessel walls. The point especially that is to be relied on, however, is successive crops appearing from day to day, the earlier ones fading as compared with the later. Before we can locate the disease in the heart, there ought to be some signs or symptoms referable to it.

COTTON (17) bases his diagnoses on signs of gross valvular disease - aortic regurgitation or mitral stenosis associated with pallor, enlargement of the spleen, petechiae, and clubbing of the finger - tips. A bacteriological examination of the blood is useful only in confirming the diagnosis.

DIFFERENTIAL DIAGNOSIS.

(a) In the early stages the presence of fever calls for the exclusion of other febrile conditions such as Influenza, Typhoid Fever, Tuberculosis, Bacillus Coli Infections, Portal Pyaemia; the pyrexia preceding an attack of erythema nodosum when the pyrexia is prolonged; the pyrexia intervening between the primary infection with syphilis and the appearance of the secondary rash; and Hodgkin's disease in which the glands are deep-seated and difficult to detect - CAMERON (18).

(b) From other conditions of splenomegaly: e.g. in Banti's disease; Pernicious anaemia; the leukaemias; Malaria; Typhoid Fever.

(c) /

(c) From rheumatic endocarditis and acute bacterial endocarditis. In the subacute type the presence of Osler's nodes is pathognomonic. In acute bacterial endocarditis there are small, dark red, papular, lesions in the skin of the dorsum of the foot, and the palmar side of the hand, but these are smaller and not tender. The nodes found in rheumatism are sub-cutaneous, not tender, and differ entirely from the Osler node.

The cases of subacute bacterial endocarditis are characterised by embolic features, petechiae, embolism, embolic aneurisms, and the tender nodes; whereas in rheumatic endocarditis embolic features are not produced by the endocardial lesions because they are firm and small.

The distinction between acute and subacute endocarditis is made according to duration - acute cases having a duration up to six weeks; whereas the subacute cases last from 4 - 18 months. The subacute cases are due to the streptococcus anhaemolyticus in 95% of the cases, the other 5% are due mainly to the Influenza bacillus. Blood culture may therefore, if positive, assist in the differential diagnosis. - LIBMAN (19).

PROGNOSIS. /

PROGNOSIS.

There is a consensus of opinion that Subacute Bacterial Endocarditis is an extremely fatal disease. The disease usually lasts from four months to two years - average duration six months.

HORDER (20) says that the disease, once established, is invariably fatal.

LIBMAN (21) has seen four complete recoveries without any residua whatsoever. These four occurred during the course of about 150 well observed cases, and up to August 1920 he had seen over 300 cases of the disease.

COTTON (22) from observations made on 55 cases, records that 44 are known to have died with an average duration of symptoms of 14 months. He concludes that the disease is always fatal. Death occurs from heart failure, uraemia, coronary or cerebral embolism, toxæmia, profound anaemia, or some intercurrent disease such as pneumonia.

TREATMENT./

TREATMENT.

Treatment so far has been almost entirely unsuccessful. Whenever the organism can be isolated vaccine therapy may be tried. Various intravenous injections have been advocated viz:- Eusol solution, Perchloride of mercury gr.1/16 each.

ABRAHAMS (23) reports a case of streptococcal endocarditis which was successfully treated with auto-serum injections. The organism obtained by blood culture was streptococcus viridans. Treatment consisted in three injections of 20cc of the patient's own serum on three consecutive days. The condition improved with the beginning of the auto-serum treatment, and improvement continued for three weeks, when the patient was discharged apparently completely cured.

HEMSTED (24) records a case of recovery. On two occasions streptococcus salivarius was recovered from the blood. The case was treated with autogenous vaccines and autogenous serum.

Treatment should also be symptomatic.

CASES INVESTIGATED /

CASES INVESTIGATED.

Case 1. Ellen Jones, Llansawel. aet.29. Seen on 31-8-20.

She complained of "feeling run down" Patient was pale, sallow and thin. The temperature taken at 11a.m. was subnormal.

The heart was not enlarged, but there was a loud systolic murmur, most audible over the mitral area, and this was propagated to the axilla, and across the back to the opposite axilla. The result of urine analysis was as follows:-

Acid; Sp.G.1012; amber; contained albumen; granular casts, granular debris and epithelial cells.

Seen again on the afternoon of 3-9-20 the patient was doing housework. She now complained that her left knee was painful.

The knee was found to be swollen but not red, and there was free fluid in the synovial cavity. A few crepitations were now heard over the right apex, posteriorly, and in front over the left lung in the neighbourhood of the 3rd and 4th costal cartilages. Temp.101, Pulse 110, Resp.24.

A blood count on 13-10-20, during a febrile period, showed marked leucopenia, the white cells numbering only 2,200.

On 25-10-20 the white cells numbered 3,000.

On. /

On 21-9-20 a urine film contained one or two short streptococci.

On October 9th the pulse at right wrist was barely perceptible, and the patient complained of pain in the right elbow joint. The joint was swollen, and measured one inch more than the left elbow joint. Extension of the joint was restricted, and pronation and supination were lost. Brachial pulsation could be felt in front of the elbow joint.

The spleen extended $1\frac{1}{2}$ " below the left costal margin, and both kidneys were palpable. The urine contained albumen, and red and white blood corpuscles.

On 13-10-20 the complexion was distinctly muddy with a pink malar flush. The patient had been awake since 3a.m. with pain in the "left side!" This was said to be of a shooting nature and intermittent, and had seemed to pass down from the left hypochondrium to the pubes. There was tenderness over the spleen, and the heart was now enlarged with the apex beat half inch outside the mammary line. There was no change in the character of the bruit. The urine contained albumen, and a copious amount. /

amount of blood. Microscopically the urine resembled a blood film. On 18-11-20 blood - red cells 3,260,000. white cells 5,600. Hb.52%. Colour index 0.8.

On 5-12-20 a crop of petechiae appeared on the right side of the neck above the clavicle. On 7-1-21 a few petechiae were observed in the conjunctivae. she had now developed an aortic systolic murmur. The course of the disease was marked by progressive anaemia, and great loss of flesh. The temperature was of a swinging character, with occasional afebrile periods extending over several days. The loss of flesh and strength was progressive, and patient died on 14-1-21 from heart failure with oedema of the feet and ankles.

Blood culture grew a short and delicately growing streptococcus, gram-positive; and a short streptococcus which appeared identical in properties with the blood organism, was isolated from a carious tooth.

Previous history:- Had acute rheumatism when 14 years of age, but there was no cardiac history, and she had enjoyed satisfactory health up to the present illness.

Case 2. Peter Brown, aet. 31. Miner.

Admitted R.I.E. Ward 26. 6-12-20 (Prof. Meakin's case).

In August 1920 patient noticed small spots on his legs. These were all situated below the knee. They never completely disappeared, but remained a dull-brown colour when a crop of new ones appeared. Had one crop on face, otherwise he enjoyed excellent health but for shortness of breath on exertion.

When admitted the cheeks were flushed, rest of face was pale, and the conjunctivae were pale. There were small petechiae scattered over the legs between the knees and ankles. These petechiae were of variable size, and were mainly on the anterior surface.

The pulse was regular in rhythm, rate 96, but after walking round the ward the rate was 136. The apex beat was in the fifth interspace, with the left border $10\frac{1}{2}$ cm. from mid-sternal line. The right border was 2 cm. from mid-sternal line, and there was marked pulsation in the neck. Auscultation revealed a mitral systolic murmur, which was propagated into the axilla. There were systolic and diastolic bruits over the aortic area, and these were both propagated. //

propagated. The spleen extended slightly below the costal margin. The kidneys were not palpable, and the lungs showed nothing abnormal. There was marked pyorrhoea alveolaris. His condition improved and he was discharged from Hospital, but was readmitted on 3-3-21. There was no recurrence of petechiae, but patient had a sense of tightness across the upper chest. He was very breathless, and very pale, and the character of the murmurs had become much harsher.

The temperature throughout was of a swinging character, with periodic remissions. On 24-3-21 the general condition was much worse, with orthpnoea and profuse sweating, and patient complained of severe pain over the splenic area. The spleen, however, was not palpable, but there was rigidity in the left flank. Death took place on 27-3-21. A gram-positive streptococcus was isolated from the blood in pure culture.

Past history:- No acute rheumatism; Gonorrhoea 2 years ago, with relapse 3 months ago. He was wounded in the right upper arm.

Autopsy, /

Autopsy revealed the following:-

Heart - was dilated and hypertrophied. The mitral valve was incompetent, with numerous small vegetations on the free edges of the cusps and on the chordae tendineae. There was little, if any, evidence of chronic endocarditis. The aortic valve cusps showed slight fibrous thickening and recent vegetations.

Liver - was congested and fatty.

Spleen - showed several ^{old} ~~red~~ depressed infarcts which had been in existence for years. There was chronic and recent perisplenitis.

Kidneys - showed venous congestion and fatty change. The right organ contained a very old fibrous infarct, whilst the left showed an extensive and recent infarct involving more than half the organ, and affecting medulla and cortex.

Case 3./

Case 3. Richard Hinds, aet. 13 years. Schoolboy.

(Professor Boyd's case).

Admitted into R.I.E. on 12-12-20 complaining of palpitation, extreme rapidity of the heart action, shortness of breath, and stiffness of the legs. This had lasted about a fortnight.

Patient was perfectly well up to a month before admission, when he is supposed to have developed mumps, but it is doubtful if the condition was really parotitis. He has had pain in the joints of the legs and arms, which were painful when moved, and tender to touch. The knees were never red or swollen. Later he had precordial pain and cough. On admission patient was slightly cyanosed. The pulse rate was 132, and temp. 99.5. The heart showed diffuse pulsation, but the apex beat was in the fifth interspace, and three inches from the middle line. Right border in the third interspace was one inch from the middle line. Auscultation revealed a mitral systolic murmur. A systolic bruit was also audible over the tricuspid area, probably propagated from the mitral./

mitral area. All other sounds closed.

Both knees slightly swollen with free fluid.

Respirations were 44. The lungs showed a few fine crepitations over the left apex, whilst over both bases a few fine rhonchi were audible.

The liver was slightly enlarged.

The urine contained a little albumen.

The temperature chart showed occasional remissions.

On 5-1-21 patient complained of severe colic, which simulated an acute abdomen. This was believed to be embolic. The abdomen was tapped for removal of free fluid.

During the course of the illness the cardiac murmurs have changed, and double murmurs - systolic and diastolic - have been audible over all areas.

On 15-3-21 patient complained of soreness on left side of neck. The area was tender and showed slight general infiltration. On the following day, however, the left external jugular vein was found to be thrombosed.

Seen on 24-3-21 patient looked slightly cyanosed with a faint yellow tinge. There was considerable loss of flesh.

Temperature. /

Temperature was 96.8, Pulse 112, dichrotic but regular in rhythm. The heart was enlarged, and the apex beat was now half inch outside the mammary line.

The liver was greatly enlarged, and extended below the umbilicus. The spleen was not palpable. The left external jugular vein was still thrombosed. There were no petechiae.

Previous illnesses:- Whooping cough and pneumonia when a baby. Had chorea when 9 years old, which lasted for about 12 months.

Case 4. Mary Ann Jones, aet. 25. Music teacher.

Aldergate, Felinfach, Lampeter, Cardiganshire.

About 7-2-21 patient consulted her Doctor on account of a feeling of "out-of-sorts" and fleeting joint pains. The joints were neither red nor swollen. Her temperature was 100. The only abnormal physical sign was a mitral systolic murmur propagated to the axilla. There were no signs of cardiac failure, but on account of the pyrexia she was ordered to bed. Her temperature has varied from 100 - 102 ever since.

Two days after she had been ordered to bed she came downstairs. /

downstairs to play a piano accompaniment for a party of singers, but she found that her finger tips were too painful to touch the keyboard. This tenderness of the finger tips lasted 2 - 3 days. The tip of the left small toe became painful about the same time.

From time to time she has observed little red spots all over her body, legs, trunk, and arms. These lasted a few days and then became rather purplish in colour.

Seen in consultation on 4-4-20 the patient was pale with a little malar flush. The face was wet with perspiration. There was much dyspnoea and activity of the alae nasi. Temp. 101, Pulse 120, Resp. 40.

The lungs showed no abnormal signs, but systolic murmurs were heard all over the cardiac orifices - mitral, tricuspid, aortic, and pulmonary. The mitral murmur was propagated to the axilla, and could be heard all over the back. The aortic murmur was ~~harsher~~ than the mitral and was propagated into the neck. There was no sign of cardiac failure, and the apex beat was in the left mammary line.

The /

The spleen was not palpable but patient complained of severe pain, which had come on two days previously, and which she referred to the splenic area. A distinct rub was audible over the spleen. There was a solitary petechia, dark-brown in colour, on the pulp of the middle finger of the left hand. There was no clubbing of the fingers.

The urine contained albumen and minute traces of blood.

Past history:- Had acute rheumatism when a child. She never apparently suffered from cardiac embarrassment, and two years ago she cycled 28 miles in heavy rain along a very hilly road. She had enjoyed good health up to the present illness.

Discussion. /

Discussion on the Cases investigated.

- (a) In three cases the onset of the disease was insidious.
- (b) In all cases there were definite signs of endocardial infection.
- (c) The fever may be overlooked if not taken daily, on account of the remissions which are so typical of the disease.
- (d) Embolic features were present in all cases, the sites of the emboli showing wide variation.
- (e) Joint pains were present in 3 out of 4 cases.
- (f) The painful nodes which are considered by Libman as pathognomonic were only manifested in one case (case 4).
- (g) Petechiae were present in 3 out of the 4 cases.
- (h) The spleen was enlarged in two cases, but a third case (case 4) gave signs of perisplenitis.
- (i) A gram-positive streptococcus was obtained from the blood of two cases, whereas in one (case 1) a similar organism was found in the urine, and in a carious tooth.
- (j) /

(j) Two cases showed slight clubbing of fingers.

(k) Three cases out of the four had a rheumatic history - two had had acute rheumatism, and one chorea.

(l) Two cases have already died: the other two are still under treatment.

The early recognition of Subacute Bacterial

Endocarditis will in many cases be a matter of extreme difficulty. Once the cardinal signs of the disease have become manifest, so much permanent damage has been wrought, that hope of cure is almost surrendered to a mere joy of accurate diagnosis. Hope, therefore, looks anxiously in the direction of early recognition, when treatment, which is at present so barren a prospect, may succeed in arresting the disease before gross structural damage has ensued. It seems, however, that diminished resistance plays a prominent part in the infective process, for it is indeed a striking feature that a micro-organism of such low virulence as the streptococcus anhaemolyticus should be capable of producing so much disaster. Whether the disease is due to the lighting up of old necrotic foci in the valve cusps, /

cusps as Poynton holds; or whether it is a new infection superimposed on an old valve lesion, the presence of the gram-positive streptococcus in the blood stream must have some significance. In view of the low pathogenicity of the blood organism the bacterial^{logical} picture may, after all, be one of symbiosis.

The great frequency of the history of previous Rheumatic Fever, together with the common post-mortem finding of old endocarditis, must call for a wider outlook in our ideas concerning valvular disease of the heart.

The modern trend of thought has tended to a one-sided view, and murmurs have been too much studied from the point of view of the functional integrity of the heart as an organ capable of maintaining an efficient circulation. The equally important question of susceptibility to infection has been overshadowed by mechanical speculations. With fuller study and deeper knowledge of Subacute Bacterial Endocarditis, as well as of the acute forms, will come the larger vision. Until acute rheumatism has been /

been placed upon an unassailable bacteriological basis,
or until the bacteriology of Subacute Bacterial Endocarditis
has established the disease beyond doubt as a separate
entity, the etiology will remain a matter of controversy.

My thanks are due to Professor Boyd and Professor
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REFERENCES.

1. HORDER, B.M.J. Lond. Aug.28, 1920. 301.
2. LIBMAN, Tr. Internat. Cong. Med. 1913. Lond.1914.
Sect.vi Medicine pt 2. 195-211.
3. HUDSON, B.M.J. Lond. 1918 ii 512.
4. STARLING, Ibid. 154 - 157, 2 pl.
5. LIBMAN, Tr. Internat. Cong. Med. 1913, Lond.1914.
Sect.vi Medicine pt 2. 195-211.
6. LIBMAN, B.M.J. Lond. Aug.28, 1920. 305.
7. LIBMAN, Ibid.
8. SMITH and KENNICUT, Boston M.& S.J. 1912, clxvii 810 pl.1
9. KAMMERER, Munchen. Med. Wchnchr.1914,lxi, 588-592.
10. MALLOCH & RHEA, Quart. J. Med. Oxford 1918-1919,
xii. 174 - 182.
11. HORDER, B.M.J. Lond. Aug.28. 1920. 302.
12. POYNTON, Ibid. 306.
13. CAREY COOMBS, Ibid. 306-307.
14. HORDER, Ibid. 302.
15. GOW, Ibid. 307.
16. GIBSON, Ibid. 308-309.
17. COTTON, B.M.J. Lond. Dec.4. 1920, 851-854.
- 18./

18. CAMERON, The Clin. Journ. No.1311, (Vol.xlix.No.14.
197 - 201.
19. LIBMAN, B.M.J. Lond. Aug.28. 1920. 305.
20. HORDER, Ibid. 30d.
21. LIBMAN, Ibid. 305.
22. COTTON, B.M.J. Lond. Dec.4. 1920. 853-854.
23. ABRAHAMS, N.York. M.J. (etc) 1914 C 1216.
24. HEMSTED, Lancet. Lond. 1913 i 10-14.